



Ethiopian Federal Ministry of Health

Information Revolution Roadmap

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Acronyms

ADRs	Adverse drug reactions
CHIS	Community Health Information System
CRVS	Civil Registration and Vital Statistics
CSA	Central Statistical Agency
DHS	Demographic Health Survey
DQA	Data quality assessment
DTC	Drug and Therapeutic Committee
eCHIS	Electronic Community Health Information System
eHMIS	Electronic Health Management Information System
HER	Electronic Health Record
eHRIS	Electronic Human Resource Information System
eIFMIS	Electronic Integrated Financial Management Information System
eLIS	Electronic Laboratory Information System
eLMIS	Electronic Logistic Management Information System
EMR	Electronic Medical Record
EPHI	Ethiopian Public Health Institute
EPI	Expanded Program of Immunizations
eRIS	Electronic Regulatory Information System
FF	Family Folder
FMoH	Federal Ministry of Health
GIS	Geographic information system
HC	Health center
HP	Health Post
HDA	Health Development Army
HDD	Health Data Depot
HEP	Health Extension Program
HEW	Health Extension Workers
HGIS	Health Geographic Information System
HIS	Health Information Systems
HIT	Health information Technicians
HITD	Health Information Technology Directorate
HMIS	Health Management Information System
HRIS	Human Resources Information Systems
HSDP	Health Sector Development Program
HSTP	Health Sector Transformation Plan
ICD-10	International Classification of Disease (10th set)
ICT	Information Communication Technology
IFMIS	Integrated financial management information system
IR	Information Revolution
IVR	Interactive vocal recording system
LQAS	Lot quality assurances system
M&E	Monitoring and evaluation
MFR	Master Facility Registry
MNCH	Maternal, newborn, and child health
NESB	National Enterprise Server Bus
NGOs	Non-governmental organizations
PHCU	Primary Health Care Unit
PHEM	Public health emergency management
PRT	Performance Review Team
RCA	Root cause analysis

RDQA	Routine data quality assurance
RFP	request for proposal
RHB.....	Regional Health Bureau
RS.....	remote sensing
SCMS.....	Supply Chain Management System
SNNPR	South Nations, Nationalities and People's Regional State
SARA.....	Service Availability and Readiness Assessment
SPA+.....	Service Provision Assessment
TE	Tele-education
TM	Telemedicine
TMS.....	Terminology Management Service
VERA.....	Vital Event Registration Authority
WorHO	Woreda Health Office
ZHB	Zonal Health Bureau

Introduction

There have been remarkable improvements in the health status of Ethiopia over the past two decades during the five rounds of the Health Sector Development Program (HSDP). However, despite the progress achieved so far, there are still challenges to be addressed in improving the health of the population, the quality of care, and the inequalities in access and service.

The Federal Ministry of Health (FMOH) introduced the Health Sector Transformation Plan (HSTP), which focused on addressing quality and equitable distribution of health service delivery for all. One of the four transformation agendas in the current HSTP is the Information Revolution. It refers to the phenomenal advancement in the methods and practice of collecting, analyzing, presenting, and disseminating information that can influence decisions in the process of transforming economic and social sectors. It entails a radical shift from traditional methods of data utilization to a systematic information management approach powered by a corresponding level of technology. The Information Revolution is not only about changing the techniques of data and information management; it is also about bringing about fundamental cultural and attitudinal change regarding perceived value and practical use of information.

Health Information Systems (HIS) in Ethiopia are run under different authorities. For example, while the routine Health Management Information System (HMIS) is managed primarily by the FMOH, population-based information comes predominantly from the Central Statistical Agency (CSA). The Ethiopian Public Health Institute (EPHI), universities, and individuals conduct various research activities, the former in line with the priority research needs identified by the FMOH. The fragmentation of the governance of HIS puts in place organizational obstacles in the coordination of digital health investments.

The routine HMIS has been a primary source of information for continuous monitoring of health services in the country. In response to the changes in health system organization, epidemiological patterns (with an increment of non-communicable diseases), service delivery modality, focus on maternal health, and quality of services, as well as international strategies and programs, the FMOH has undertaken revision of the HMIS which is more comprehensive and is strengthening the standardization process through incorporating new initiatives. The electronic system is in place to support this function. Similarly, a Community Health Information System (CHIS) was introduced to capture basic health and health related information by Health Extension Workers (HEW) at household and individual level. The CHIS collects data on basic demographic statistics and health service delivery and utilization based on the health extension package delivered through the Health Extension Program.

The FMOH, through the HSTP, envisions all of its citizens enjoying equitable and affordable access to all types of health services. The achievement of this vision entails robust monitoring and evaluation (M&E) systems that reveal the status of utilization of health services and desirable healthy practices using key equity lenses. This is addressed through the establishment of an effective cycle of data gathering, sharing, analysis, understanding, reporting, and application in decision making. This is the process whereby data are transformed into information and knowledge for action.

Multiple data sources will be used to track the HSTP targets. Data sources will include: routine administrative sources, such as the HMIS; household surveys, such as the Demographic Health Survey (DHS) and Expanded Program of Immunizations Coverage Survey (EPI); health facility surveys, such as the Service Provision Assessment Plus (SPA+) and the Service Availability and Readiness Assessment (SARA); disease and behavioral surveillance; civil registration and vital statistics; financial and management information; censuses; and research studies.

The utilization of the newly produced information in policy and strategy formulation and in planning and decision making, especially at the lower levels, is not widely practiced. The national health information system (HIS) is lagging behind in generating information needed to measure and respond to health inequities and their key determinants. In addition to measuring average or aggregate levels of indicators, it is essential to be able to stratify and disaggregate measures according to demographic (age and sex), geographic (urban/rural and regional differences) and socioeconomic (wealth and education) categories, as well as to develop appropriate indicators reflecting equity. Furthermore, data from both the public and the private sectors will be gathered to provide the full picture of the health system performance. Since many determinants of health are found outside the health system (e.g., education, road infrastructure, water, and sanitation), it is crucial to integrate data sources from other sectors.

The rationale for developing this Information Revolution Roadmap is that all functions of the health system rely on the availability of timely, accurate, and dependable information for decision making. Revolutionizing the availability, accessibility, quality, and use of health information for decision-making processes, through the appropriate use of information communication technology, can ultimately impact the access, quality, and equity of healthcare delivery at all levels in Ethiopia.

Realizing the Information Revolution

Why the Information Revolution?

The principal driving force for the Information Revolution in the health sector can be explained using two major factors. The first factor is the growing magnitude and type of information needed in the health sector which has increased the overall demand for health information. The reasons for this increased demand are many. It is a priority of the Federal Ministry of Health (FMoH) to expand and sustain the progress that has been made previously, which will require visioning the future health care system and strategic planning. Over the last couple of years, the FMoH engaged in a visioning exercise to think broadly and strategically about how the long-term development of the Ethiopian primary health care system will ensure high quality, equitable, sustainable, adaptive, and efficient health services to meet the health needs of a changing population. Responding to such dynamic internal and external environments requires an increased amount and type of data and more reliable quality of information. The second factor is related to the political will where the sector is expected to operate within an accountable and transparent environment. Results-oriented, accountable, and transparent systems require the use of a wide range and various types of information.

The secondary driving force for the Information Revolution can be attributed to the opportunities created by the advancement of the information and communications technology (ICT) industry. The fact that ICTs revolutionized the way information is managed demands that the health sector shift from custom-based technology to modern technology. This advancement is further expedited by the level of technological innovation within the sector. This force can be explained as a stimulant of the technological environment and the response of the health sector to harness the benefits.

Objective

The objective of the Information Revolution is to maximize the availability, accessibility, quality, and use of health information for decision making processes through the appropriate use of ICTs to positively impact the access, quality, and equity of healthcare delivery at all levels

Specific Objectives

- Create a culture of data use that leads to evidence-based decisions and action at all levels of the health system
- Significantly improve the methods and practices of the analysis and use of health information
- Optimize data quality at all levels
- Enhance access and visibility of health information for patients and the wider public
- Establish an interoperable architecture to strengthen integration, standardization and harmonization among priority data sources and health information systems
- Employ appropriate information and communication technologies to strengthen all aspects of data use

Situational Analysis – The Current State

Quality and Utility of the Routine Data

Quality of data is a key factor in generating reliable health information that enables monitoring progress and making decisions for continuous improvement. The need for organized, accessible, timely, and accurate data for health decision making has become a growing concern at national and international levels. In response to this, the FMoH has undertaken an extensive reform and redesign of the national HMIS. The reform has taken major steps to respond to the deficiency of routine health data that limited the quality of care, planning, and management systems, as well as decision making by managers at all levels in the health care system.

Following the reform process, efforts were made to train managers, health professionals, and support staff on the reformed HMIS to enhance their knowledge and skills, improve data management (recording, reporting, data quality), and establish and institutionalize performance review teams (PRT) and data quality assurance mechanisms.

Efforts were also undertaken to promote the use of ICTs in the delivery of health services. Accordingly, health information technology initiatives have been put into place, though to varying levels of implementation and adoption, to improve access and quality of health services using appropriate technology. The initiatives cover a wide range of applications including telemedicine, tele-education, mobile health, electronic HMIS (eHMIS), electronic medical records (EMR), geographic information systems (GIS), and human resource information systems (HRIS).

CHIS has been designed to extend effective information management and decision making to the grassroots level. Owing to the family-centered provision of health services, a Family Folder (FF) was put in place to record health information related to members of the family from birth to death, as well as housing conditions. The implementation of the Family Folder and CHIS improved availability of various data for planning, monitoring, and informed decision making at lower levels. However, the increasing number of health posts and enormous quantity of data being collected through the FF and CHIS makes the data collection process cumbersome and time consuming. Digitization of the Family Folder will reduce the data collection burden and simplify data collection, compilation, storage, analysis, and reporting, and thereby transform the value of the CHIS.

Efforts have also been made to improve the culture of information use, in particular at the point of data collection. Although some improvements have been observed, ensuring data of sufficient quality and promoting an information-use culture at the point of collection remains critical and challenging.

Gaps in knowledge and skill of health professionals on data management are a critical issue that needs continuous effort in order to change the mindset of health professionals. The knowledge and skill level of health workers on the reformed HMIS significantly influences data management processes, timeliness, completeness, and accuracy of data at the point of service delivery. Therefore, ongoing training of health professionals on the HMIS, incorporating HMIS and M&E in the training curriculum of health professionals, and strengthening generic training of ICTs for health is a great benefit to the health sector.

A well-functioning health information system ideally comprises: census, demographic, surveillance system, and administrative records, disease surveillance; household surveys; registration of vital events; patient and service records; and program-specific monitoring and evaluation. In Sudan, due to the absence of a robust health information system, surveys are held periodically. These are often purpose-specific and rarely comprehensive.

The overall data quality assurance and the tools that are commonly used were assessed, and it was revealed that they use Lot Quality Assurances System (LQAS), PMT, and ISS, however those are also done less frequently and not with proper focus on data. They are done with the limited skills of the HEWs and other health professionals. Therefore, the quality of the health information is poor in most cases and is a major challenge. It was found that most data quality assurance tools used in the Ethiopia health system were self-assessed and not sufficiently comprehensive. It is important to implement comprehensive data quality assurance mechanisms, such as routine data quality assurance (RDQA) and to provide additional capacity building in this area. There is a need to improve information-use practices with better understanding of the health indicators on the revised HMIS and others, self-quality assessment through LQAS, added skills on analysis and information use, and mentorship to all involved in the health information systems. The greater focus could be on the HITs and all health professionals and health extension workers.

Performance Monitoring

Well-designed and documented data sources, monitoring and evaluation structures, availability of guidelines, finance, and skilled staff are all key resources for an effective performance monitoring system. These factors enable the system to contribute to remarkable improvements of health status through the tracking progress of key indicators, early identification of health system bottlenecks, and enhancement of evidence-based decision making. In this regard, the routine data quality assessment found that shortages of HIT personnel, missing and incomplete source documentation, gaps in knowledge and skills in monitoring and evaluation, and insufficient budgetary allocation were major challenges to an effective performance monitoring system.

Selecting key indicators based on their importance and representativeness is crucial for routine monitoring of key aspects of health system performance. Based on the performance improvement framework, teams should monitor performance compared to planned targets using different decision support tools. However, the RDQA report indicated that few health facilities have practiced institutional performance monitoring to periodically compare their performance with their plan. The majority of health facilities assessed did not have action plans that were communicated to the respective bodies, and few health institutions were using display charts.

Knowledge sharing and reapplication of experience narrows the performance difference and enhances country progress in setting goals. In line with this, the FMoH developed guidelines to enhance and standardize documentation and sharing of best practices in 2013. Since then, administrative units at different levels have considered documenting and sharing best practices on different priority areas in their annual plans, but the achievement is not yet satisfactory.

Available information must be disseminated in a timely fashion and used for strategic decision making at all levels of the health system, otherwise its availability is meaningless and useless. In this regard, the FMOH has begun to disseminate M&E findings to stakeholders using different channels such as reports, M&E digests, policy and practice bulletins, health and health related indicators, newsletters and fact sheets, and web sites. However, the distribution of published information dissemination tools is generally limited to higher levels. Regional Health Bureaus (RHBs), health agencies, and hospitals have used some of the communication outlets to share public health messages. Some regions have web sites (e.g. Tigray, SNNPR, etc.) and most of them have annual health bulletins.

In the past, the performance monitoring system was framed in such a way to measure achievements using selected indicators and Millennium Development Goals (MGDs). There were no indicators to review and measure quality and equity of the services. However, given the fact that the current HSTP focuses on quality and equity, indicators that could measure quality and equity should be incorporated in to the core indicators. Furthermore, the five-year Information Revolution plan of the health sector at all levels needs to have a documentation mechanism and a tool to track the performance monitoring methods that are being conducted as per schedule and per procedures.

Electronic Government (eGov)

Electronic health (eHealth) is one of the focus areas for the government of Ethiopia. It is imperative that the field of health is IT-enabled, not only to improve the efficiency and the effectiveness of hospitals and labs, but also to build a base for gaining access to future advancements in the medical sciences. The field of health is also a prime candidate for leveraging ICT for better service delivery to the citizens of Ethiopia.

Utilize and Broaden Existing ICT Infrastructure

Woreda Network: This is a state-of-the-art ICT infrastructure deployed by the Ministry of Communication and Information Technology. It has high bandwidth connectivity between ministries and agencies for sharing data, voice, and video communication throughout the country. WoredaNet is mainly used to connect government institutions that exchange sensitive data electronically. Health data is confidential data that needs more security and high bandwidth infrastructure. In addition, WoredaNet has reached almost all woredas, which is a cost effective way to connect RHBs, ZHBs, WorHOs, hospitals, health centers, health posts, and communities. Moreover, since some major nationwide electronic systems such as IFMIS (Integrated Financial Management Information System) have already deployed in the WoredaNet infrastructure, it will be much easier to create interfaces and coordinate with national eHealth systems. Therefore, WoredaNet will be one channel to implement various eHealth systems during the implementation of HSTP.

National Data Centre: This is a centralized storage facility that helps to store and provide adequate space to the data that is coming from various government sectors and agencies. The major applications that are hosted in the national data center are the national Ethiopia government portal (www.ethiopia.gov.et), Electronic Health Management Information System (eHMIS), Electronic Community Health Information System (eCHIS), and IFMIS. Therefore, this data center will also support the health sector to store health data and make it accessible to the responsible bodies when needed.

Interoperability Layer Across eHealth Applications: To avoid redundancy and fragmentation, it is mandatory to create an interoperability layer among all eHealth applications. Many applications might be developed by different software programming tools and run on different hardware platforms. Because of this, the FMOH has been facing many challenges. Specifically, exporting and importing data from one electronic system to another electronic system is unthinkable. As a result, it is very hard to gather, organize, and analyze health information across various information sources and use it for decision making. The National Enterprise Service Bus (NESB) will provide a platform for seamless integration of ministry and agency applications and databases at the back end and integrate all front end channels to deliver electronic health applications. Above all, this NESB system will support the health sector by creating an interoperable environment at the back end for various eHealth applications.

2G, 3G, and 4G Internet Connectivity

Ethiopian Telecom (Ethio Telecom) is working relentlessly to cover all parts of the country with mobile network connectivity. Along this network, voice and 2G mobile internet coverage reaches almost all woredas, 3G is available in major cities, and 4G is only available in Addis Ababa but Ethio Telecom has a plan to scale it up nationwide. It is a breakthrough technology that helps to reach all agricultural and pastoral communities. Therefore, this mobile coverage is an opportunity for all health facilities to deploy various mobile-based systems, for example MNCH/PHEM/Stock Out IVR system, Mobile-Based Community Health Information System (mCHIS), Enat Messenger, etc.

Electronic Health (eHealth)

ICTs have a fundamental role in today's healthcare delivery system, especially in simplifying information exchange, assisting with timely decision making processes, and improving the effectiveness of operations. The FMOH has long since recognized the benefits of ICT to support and transform the health sector of Ethiopia. The FMOH, together with agencies, NGOs, civil societies, and communities at all levels, has deployed a number of ICT initiatives. The health sector must invest significant resources to leverage these ICT investments as supportive tools for the effective and efficient delivery of services and to bring critical information to the table for all health system actors.

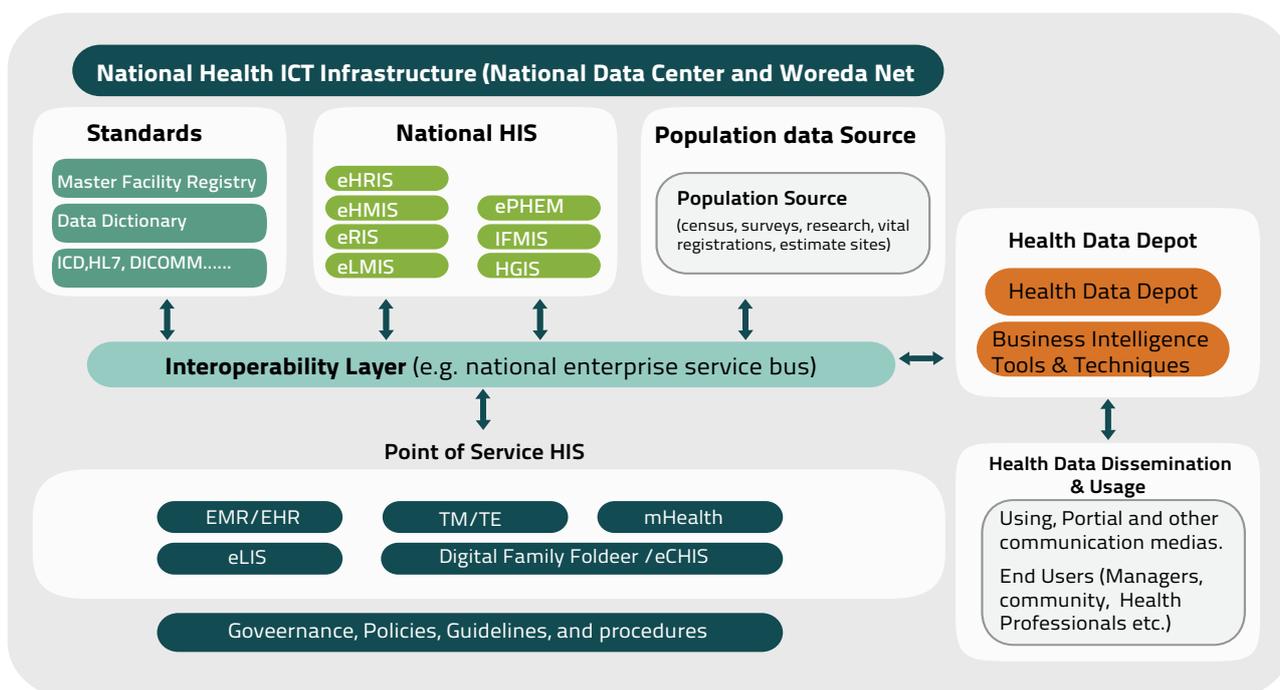
National Health Information Enterprise Architecture

An enterprise architecture defines the conceptual relationships between the health information systems (HIS) that the FMoH proposes to support, and provides a roadmap for iterative development and integration of a robust health information infrastructure. The architecture illustrated in Figure 1 represents the Ethiopia national health enterprise architecture based on the interventions described in this Information Revolution Roadmap. The architecture differentiates between the HIS that will be supported centrally at the national level and the point of service HIS that directly support service delivery. The national HIS includes key systems such as the eHMIS and eLMIS, population data sources such as the census and surveys, and standards-based registries such as a Master Facility Registry and Data Dictionary that facilitate interoperability. The national level infrastructure also includes a Health Data Depot (HDD) that will serve as a data warehouse for aggregation and reporting of health data across many sources.

Point of service systems are those that are deployed in health facilities or provided to health workers directly, such as electronic medical records, laboratory information systems, and the electronic community health information system (eCHIS). The national HIS are linked to the point of service HIS through an interoperability layer, also known as a national enterprise service bus (NESB), which validates and relays electronic messages between information systems in the architecture.

Each system presented in the enterprise architecture is defined in further detail in specific interventions below.

Figure 1: Ethiopia National Health Information Enterprise Architecture



Envisioning the Connected Woreda: Improving Patient Care

A primary goal of the Information Revolution is to make key data available at the point of service delivery, and to capacitate the health workforce to use this data for evidence-based decision making that will improve the quality and equity of care.

One approach to measurably enabling the Information Revolution is the “Connected Woreda”. Supported by an interoperable health information system, the Connected Woreda allows for health data to be collected, shared and used in a timely, equitable and transparent manner among and between points of service throughout the Woreda and primary health care unit (PHCU) with linkages to the regional and national health systems, thereby improving health worker performance and the quality of care.

The Benefits of the Connected Woreda

The PHCU generates and consumes considerable amounts of data, ranging from the Health Extension Program Family Folder and supply chain information to monthly disease and service reports. The Connected Woreda will establish the Woreda Health Office (WorHO) to serve as an information hub, linking the community, the PHCU and the WorHO to the regional and national health information system, and shifting ownership of health data to the PHCU. It will digitize prioritized health data, automate reporting, and optimize processes, reducing the administrative burden and making information available for use at all levels. The Connected Woreda will activate the information and cultural transformation that is necessary to drive systematic data use for decision making and improvement of the quality and equity of care.

The Connected Woreda improves performance and quality of care in many ways. A Connected Woreda:

- Improves patient care
 - Informs care through improved access to patient records, reducing medical errors and adverse events
 - Increases the amount of time health workers spend with patient care due to decreased administrative burden
 - Links patients to higher levels of care through a digital referral network, ensuring that patient medical history is available
- Improves health service delivery and equity
 - Is able to monitor service coverage within its communities, allocate resources according to utilization, and compare performance, equity and utilization with other districts

- Has alerts and dashboards to allow health workers, administrators and M&E officers to respond quickly with targeted actions to service and surveillance reports
- Utilizes ICTs to raise public awareness and promote accountability
- Empowers the health workforce
 - Electronically captures and automatically reports routine service data from health centers to higher levels, significantly reducing the administrative burden
 - Has a health workforce that understands the value of data and is motivated and trained to collect, use and share it

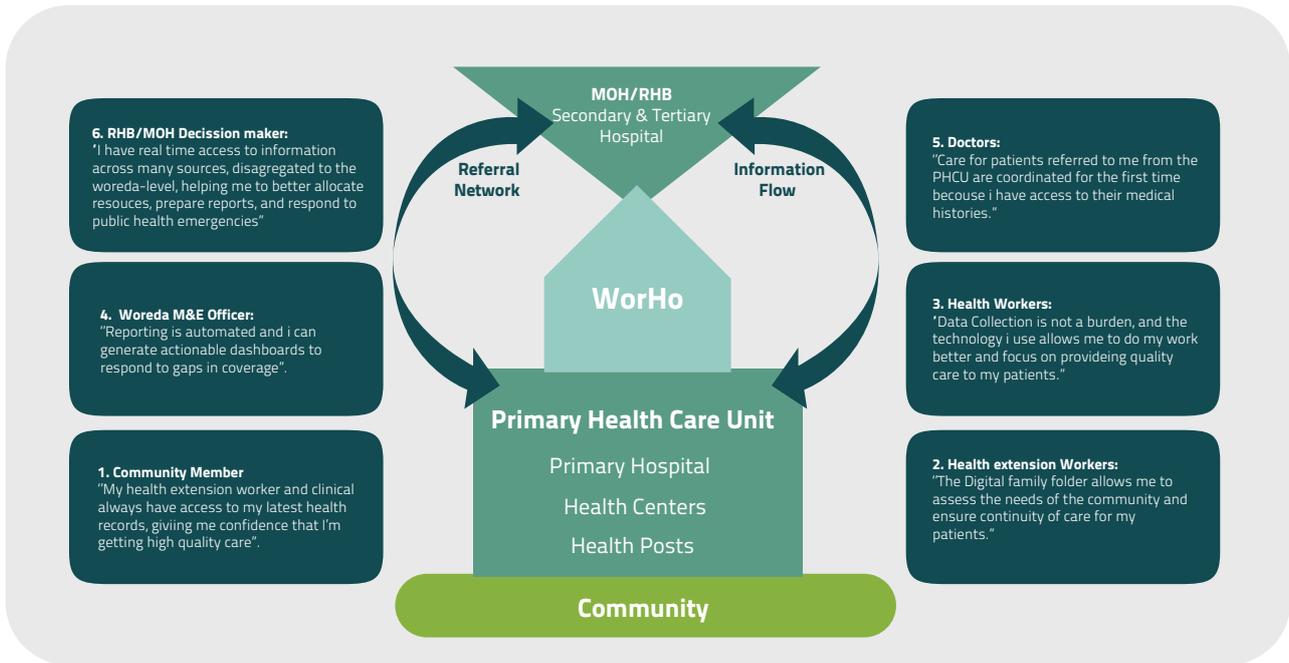
This concept improves upon traditional health information system approaches by structuring the use of data around the woreda, taking advantage of the unique role it plays in translating policies and goals set at the national level into action within health facilities and kebeles. The WorHO is at the heart of this activity, orchestrating care and public health programming. This structure provides a systemic backbone for the Information Revolution that is measurable in terms of its impact on service delivery, rather than measurable in terms of eHealth systems. The Connected Woreda directly links the Information Revolution to the Woreda Transformation Plan and builds off the Minister's priority of digitizing the family folder.

Related interventions presented in the Information Revolution Plan that are not at the woreda level will inherently have synergistic impact with the Connected Woreda. For example, efforts that strengthen regional hospital systems also improve the referral network for PHCUs and better informed national decision-making (i.e. through consolidated reports from the health data depot) improves Woreda-level planning and resource allocation.

Demonstrating the Value of the Connected Woreda

The examples in Figure 2 below (see text boxes 1-6) illustrate how stakeholders at all levels, from community members and health workers to administrators and decision makers, will experience the benefits of the Connected Woreda.

Figure 2. The value of the Connected Woreda to stakeholders at all health system levels



The Connected Woreda will interface with the interoperable national HIS to automate reporting, and subscribe to shared identifiers for facilities, providers, and terminology through standards-based digital registries. It will also integrate with the national HIS (e.g. eHMIS or HDD) for reporting and to generate dashboards to support local planning, supervision, and quality-improvement activities. The Connected Woreda demonstration project will equip the WorHO, health centers and selected health posts with the necessary infrastructure for power and periodic internet connectivity, utilizing WoredaNet where possible. The Connected Woreda will build off this infrastructure to digitize family folders, empowering health extension workers to better manage patient care and outreach to communities.

Pillars of the Information Revolution

The Information Revolution aims to transform the culture of data use to positively impact population health and health-system performance. The data-use transformation will be enabled and driven by the implementation and scale up of prioritized health information systems. This transformation is represented by two pillars:

- Pillar 1: Cultural changes on health information systems
- Pillar 2: Digitalization and scale-up of health information systems

Pillar 1 encompasses the cultural change and data-use objectives of the Information Revolution, which will be enabled through the digitalization and scale-up of the national HIS, digital shared registries, and point of service systems described in Pillar 2. Each pillar is comprised of several focus areas, which are broken down into specific interventions that are actionable and measurable.

The foundation of both pillars of the Information Revolution is sustainable HIS governance, which will be established to coordinate across governmental and non-governmental stakeholders, to align HIS strategies with health system goals, and to monitor and evaluate the execution of this roadmap. The Connected Woreda demonstration projects will ensure that interventions are designed and executed to yield improvements that impact actual health workers and patients.

Figure 3: The Components of the Information Revolution

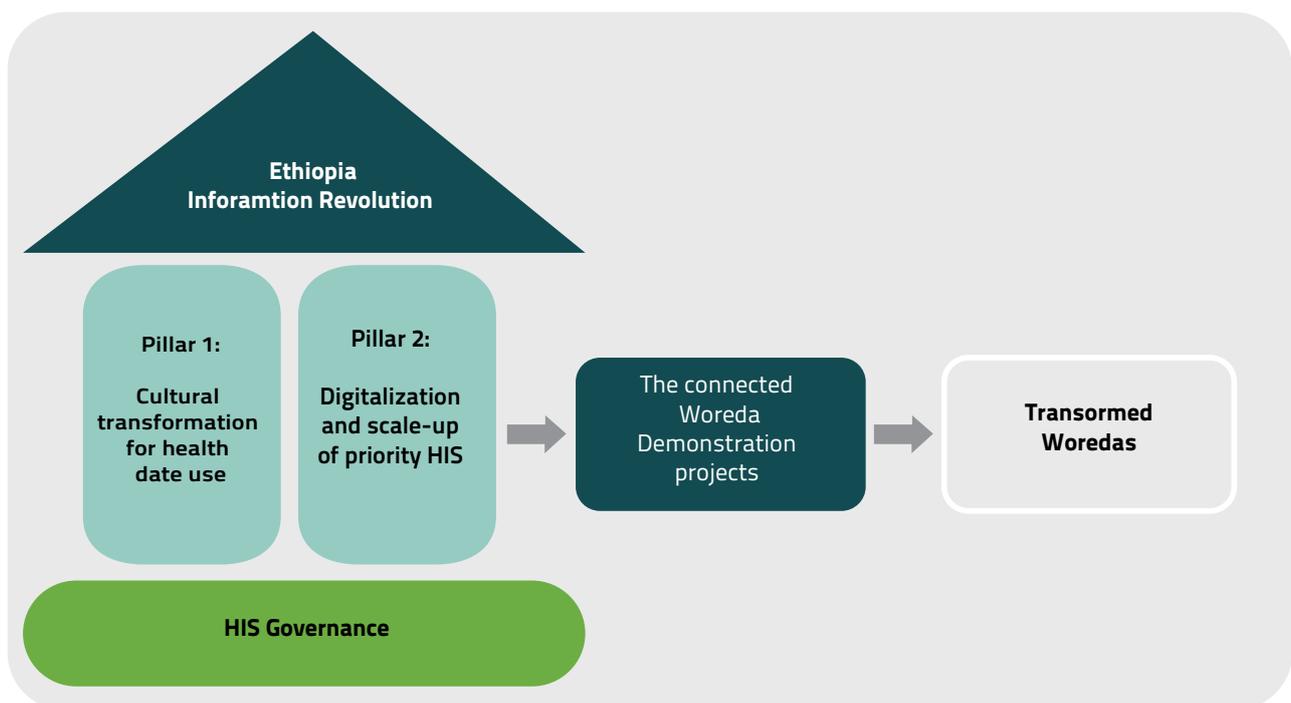


Table 1: Summary of the Information Revolution Focus Areas and Interventions

Pillar 1: Cultural transformation for health data use					
1.A. Data for service delivery, coverage, and equality	1.B. Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)	1.C. Strengthen health workforce capacity and motivation to collect, analyze, and use information at the frontline and program level	1.D. Surveillance and response	1.E. Patient safety and response	1.F. Patient engagement and awareness raising
<p>1.A.1. Strengthen availability, readiness, quality, use, and transparency of service data</p> <p>1.A.2. Increase the availability and quality of service coverage data</p> <p>1.A.3. Create data comparability and synthesis across multiple information sources</p> <p>1.A.4. Improve population data and coverage estimates</p>	1.B.1. Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)	<p>1.C.1. Strengthen human resources for health capacity to effectively use ICTs</p> <p>1.C.2. Design and implement information workflows to maximize data use</p>	<p>1.D.1. Strengthen public health emergency management data quality and integrity</p> <p>1.D.2. Reinforce data transparency and openness</p>	<p>1.E.1. Promote and build comprehensive patient safety culture that is open and fair for sharing information and ensuring lessons are learned</p> <p>1.E.2. Strengthen and improve transparency of patient safety surveillance and patient safety incident reporting system</p> <p>1.E.3. Learn and share safety lessons and encourage staff to learn how and why incidents happen</p> <p>1.E.4. Build leadership and knowledge to improve patient safety culture and incident reporting</p>	<p>1.F.1. Raise public awareness through ICT</p> <p>1.F.2. Increase transparency of information flows and promote accountability</p>
Pillar 2: Digitalization and scale-up of priority health information systems					
2.A. National health information systems		2.B. Standards-based digital registries		2.C. Point of service health information systems	
<p>2.A.1. Electronic health management information system (eHMIS)</p> <p>2.A.2. Electronic integrated financial management information system (eFMIS)</p> <p>2.A.3 Health geographic information system (HGIS)</p> <p>2.A.4. Electronic laboratory information system (eLIS)</p> <p>2.A.5. Electronic regulatory system (eRIS)</p> <p>2.A.6. Health data depot (HDD)</p> <p>2.A.7. Data presentation tools and techniques</p> <p>2.A.8 Electronic human resource information system (eHRIS)</p>		<p>2.B.1. Master facility registry (MFR)</p> <p>2.B.2. Data dictionary and terminology management service (TMS)</p>		<p>2.C.1. Electronic medical/health records (EHR/EMR)</p> <p>2.C.2. Telemedicine and tele-education (TM, TE)</p> <p>2.C.3. Mobile health (mHealth)</p> <p>2.C.4. Electronic community health information systems (eCHIS)</p> <p>2.C.5. Electronic logistics management information system (eLMIS)</p>	

Pillar 1: Cultural transformation for health data use

Focus Area 1.A: Data for service delivery, coverage, and equity

Intervention 1.A.1: Strengthen availability, readiness, quality, use, and transparency of service data

To assess the availability, readiness, and quality of services being delivered, there needs to be regular measuring of compliance with service and outcome standards, such as those developed for maternal, child health, and disease prevention. There are multiple sources of data on health service delivery. These include quality routine facility reporting systems, health facility assessments (both facility censuses and surveys), and other special studies. No single method provides all the information required to assess service delivery, and multiple methods are needed to understand it completely.

Health facility assessments provide externally generated information either through interviews or observation for data collection. Health facility assessments can be implemented as a census (i.e., assessment of all facilities in a district or country) or by using a sample survey approach (i.e., assessment of a selected sample of facilities in a district or country).

A general facility survey usually focuses on a wide range of key health services and collects information on facility infrastructure, equipment and supplies, support systems, management systems, and providers' adherence to standards. Facility surveys may also measure the quality of specific services and whether all required elements are present to provide routine care.

The facility surveys cover all types of health service sites, from hospitals to health posts, and include all public and private institutions. Data collection includes a facility resources audit, provider interviews, client-provider observations, and client exit interviews.

A facility census includes visits to all public and private health facilities in a defined area; the facility census scope can be national or sub-national, covering one or more provinces, regions, or districts. It is designed to form the basis for a national and sub-national monitoring system of service delivery. The key output is a national database and, where possible, district databases of health facilities. The database is updated on a regular basis every year. Once a reliable database system (used at the district level) is in place, the census is carried out by district teams as part of their regular supervision, with a quality control component provided by regional teams. If resources are limited and do not allow for visiting all health facilities in a country (or sub-nationally in a district, region, or province), a census is implemented in sentinel districts with additional districts added each year, to achieve a full census over a longer time period.

During the HSTP period, service delivery monitoring will be carried out on a regular basis, and the management of health services will be further strengthened. Health facility assessments (both facility censuses and surveys) and mapping will be conducted to gather data on health issues at the health

facility or unit level (health posts, health centers, hospitals). Accordingly, Service Availability Mapping will be carried out on a regular basis to ensure availability of health services that meet a minimum quality standard. Mapping will produce a service availability score card by region, woreda, and health facility (HP, HC, hospital) use selected types of services appropriate to health facilities. For example, at the HP level use EPI-Penta-3; at HC level use TB (TCD), maternal health (FP, ANC, SBA, PNC), and malaria; and at the hospital level use HIV/AIDS. Furthermore, service provision assessment (SPA+) will also be conducted every three years as scheduled. During these surveys, geo-coordinates for each health facility will be recorded.

Major Activities

- Identify data elements collected during the census
- Conduct facility census every 2-3 years
- Conduct facility survey every year
- Expected reporting units produce regular reports
- Triangulate the facility census and survey data with different sources
- Regularly present analysis of facility census and survey data to decision makers and users at every level

Intervention 1.A.2: Increase the availability and quality of service coverage data

The problems associated with developing service coverage estimates from facility data relate to completeness and accuracy of recording and reporting, as well as biases arising from differences in use of services by different populations. Low-quality data is used to make decisions without sufficient checks to verify completeness and accuracy.

The information system will respond to the issue of equity using demographic, geographic, and socioeconomic lenses. To realize this, the initiative will uncover the status of the utilization of health services and health outcomes for the disadvantaged. Equity measurement will be completed using key equity indicators and appropriate statistical measures. The country is keen to measure equity and produce a status of inequality report.

Major Activities

- Implement integrated data management protocol
- Strengthen implementation of HMIS in private health facilities
- Strengthen routine data quality assessment at all levels
- Strengthen health quality and equity monitoring

- Institutionalize measurement mechanism for service quality improvement
- Integrate service quality measurement into M&E system
- Produce a state of inequality report
- Strengthen regions and woredas to conduct action oriented research/M&E
- Conduct equity oriented study/survey every year
- Develop standard for evaluation
- Institutionalize evaluation methodologies

Intervention 1.A.3: Create data comparability and synthesis across multiple information sources

Intervention 1.A.3 is about enabling data visualization, reporting and charting across multiple information sources so that data might be used for planning, identification and prioritization of problems, performance monitoring, and providing feedback reports to support transformative and sustainable evidence-based decision making.

No single source can provide sufficient information for monitoring service delivery. Thus, a service delivery monitoring system relies on multiple sources of data brought together for analysis and decision-making. Data from routine health facility reporting systems needs to be supplemented with data from health facility assessments, surveys, etc. In addition, data generated through facility assessments should be complemented or cross-checked with data from other sources, such as the databases of health workers, infrastructures, equipment, and procurement, which are often available in various departments of the Ministries of Health. This can serve as complementary or benchmarking material for data on service delivery generated through the routine HMIS.

Health information is often not available to those who are best placed to use it to improve performance of the health system. Health and health-related data should be analyzed, made accessible to stakeholders, and utilized at all levels. Hence, data visibility refers to analyzing the health and health-related data and making accessible different data presentation techniques from display charts in the health institutions to stakeholders and mass media.

The introduction of ICT provides many opportunities, but too often data results are not used for improving clinical care and facility management. Information, regardless of the source, should preferably be collected and made available at the woreda/district level. Ideally, the foundation of a system of monitoring health resources lies at the district level, as it provides information required for decision making. Therefore, establishing a district-based system is the primary goal with support at the national or regional levels.

Major Activities

- Improve advanced analytical skill (in depth analysis, data mining)
- Conduct regular self-assessment (PMT establishment & functionality)
- Enhance accountability scorecard at all levels

- Strengthen the decision support system
- Develop an integrated platform
- Develop data access protocols for users
- Strengthen geospatial data generation, analysis, and use
- Improve data triangulation mechanisms from different data sources
- Pool health and health-related studies raw data

Intervention 1.A.4: Improve population data and coverage estimates

Population data are essential for public health decision making and generate information not only about those who use the services but also, crucially, about those who do not use them. Population-based surveys have become a primary source of data in developing countries where facility-based statistics are of limited quality. Ethiopia is not an exception.

Large scale population-based surveys are being carried out by CSA every five years. These surveys provide very valuable information and remain the only reliable source of information on health-sector outcomes and impacts. Despite their goodness as a source of information, the information lacks timeliness. Thus, to bridge the observed information gap between the surveys, it is envisioned that small-scale population-based surveys will be conducted to come up with small area estimates to answer the information need of the health sector. This process will also help to evaluate the discrepancy between the survey and routine data, supplement global estimates, and help us to produce a national micro database for small scale surveys. Hence, during the next HSTP period, efforts will be exerted to strengthen better population-based data coverage and estimates, strengthen community health information systems by introducing the use of home-based records at the HP level, and promote biometric-type recording systems for mobile communities. Furthermore, the community health information system for urban and mobile communities will be designed and implemented to further expand data sources and ensure the availability, quality, and use of service delivery coverage data.

Major Activities

- Produce a national micro database for small-scale surveys
- Strengthen home-based records and improve ownership of community data
- Design a different system for urban and pastoral communities
- Promote a biometric type recording system for mobile population
- Establish a community jury to facilitate performance review
- Establish a community name-based recording and tallying mechanism
- Develop standard HDA recording and reporting tools to ensure compatibility with CHIS
- Conduct capacity building training of HDA on M&E
- Strengthen health worker competency on data literacy
- Produce small area estimates

Role and responsibility of each actors

FMoH/RHB

- Design and implement an integrated data management protocol
- Strengthen implementation of a private HMIS
- Build capacity on data handling analysis and interpretation
- Print HMIS materials
- Identify research/evaluation agenda to be used with the results of different interventions
- Conduct a DQA every 3-6 months
- Integrate service quality measurement into a M&E system
- Measure service quality regularly
- Produce a state of inequality report
- Conduct equity-specific evaluation
- Conduct facility survey every year
- Present to decision makers and users at every level
- Promote operational research and evaluation
- Develop data access protocols for users
- Develop a data integrated platform
- Produce small estimate reports every year
- Institutionalize a system of performance reward based on the DQA
- Support implementation of the CHIS and community scorecard in all setups

Facilities

- Check data quality regularly
- Measure service quality regularly
- Synthesize information in terms of equity to access, utilization, and quality of care
- Cooperate when facilities' censuses and survey are conducted
- Conduct regular self-assessment (PMT establishment & functionality)
- Develop a community-level facility evaluation checklist
- Develop a scorecard software to be used at the woreda and above levels
- Establish a community jury to facilitate performance review
- Conduct data quality assessments at the household level
- Develop standard HDA recording and reporting tools to ensure compatibility with CHIS
- Conduct capacity building training of HDA on M&E

- Ensure competency on data literacy
- Strengthen regular performance monitoring of HDA
- Document and disseminate best practice of community M&E

Focus Area 1.B: Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)

Intervention 1.B.1: Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)

A well-functioning civil registration and vital statistics (CRVS) system registers all births and deaths, issues birth and death certificates, and compiles and disseminates vital statistics including cause of death information. It may also record marriages and divorces. Despite the well-documented benefits of CRVS, many countries do not have adequate systems in place. Globally, the births of tens of millions of children are known to be unregistered every year, and it is estimated that two-thirds of deaths are never registered and are thus not counted in the vital statistics system. In Ethiopia, while some progress has been made, there is still an enormous gap in the registration of vital events, especially for birth registration. This intervention seeks to improve coverage and use of civil registration, including causes of death at health facilities and at the community level.

Major Activities

- Develop a standard form for death reporting (adopt international certificate of death for public and private health facilities)
- Orient and disseminate the standardized death report form to all public and private health care providers, VHSG, and local authority
- Develop a tool for assessing completeness of vital registration at national and sub-national levels
- Conduct training on vital data processing and analysis at all levels of the health system
- Publish annual vital registration statistics, disaggregated to woreda (including causes of death) and distribute to all concerned institutions at central, regional, and woreda levels in collaboration with VERA
- Introduce and provide training in ICD-10 coding and verbal autopsy

Roles and responsibilities

Federal Ministry of Health

- Improve its visibility by supporting input supply such as manpower, finance, material, and budget allocation to support the vital events registration system and implementation
- Improve the quality of registration by preparing registration formats and providing the required

technical support to implement as per the proclamation; register the data of birth and death of military force under national obligation; enable diasporas and travelers by ship to get events registered in region and city administration.

- Improve the registration coverage of birth and death (and its reason) by providing training for governmental and private health institutes on understanding vital events registration definitions, use of registration methods, promotion means, and certificate issuance of events occurring at institutes
- Create a reliable vital events registration system by making governmental and private health facility data open to the nearby notary status document chief concerning vital events registration
- Distribute birth and death certificates bearing the detailed information indicated under vital events registration and national identity proclamation in all institutes where the events are occurring, and provide birth and death certification in a timely manner to all those happening in the health facilities, by designing a distribution strategy when the certificates are finished
- Information handling and security, as well as information exchange, shall be based on vital events registration and national identity proclamation No. 760/2004, chapter 4 and 5. Accordingly, the collected information in health families shall be maintained properly in a usable manner without disclosing it to a third party by the health facilities.
- Undertake monitoring and support work on the prepared checklist concerning birth and death information gathering; issue certificate and their accessibility to the nearby chief of notary
- Improve events registration coverage by making birth, death, and reason of death be the agenda of the meeting during the regular assemblies of Office of the Ministry and regional health bureaus.
- Expand the procedural system by discussing with the concerned bodies the registration of home death and reason of death to get a legal framework
- Expand the procedural system and provide training for home birth to bring about using health professionals

Regional health bureaus

- Support input supply such as manpower, finance, material, and budget allocation to support the vital events registration system and implementation
- Distribute registration recording and reporting formats

- Provide training on understanding the vital events registration systems
- Expand use of reliable vital events registration system
- Complete supportive supervisions to health facilities
- Improve vital events registration coverage
- Expand the procedural system by discussing with the concerned bodies the registration of home death and reason of death to get a legal framework

FMoH and FVERA

- The joint roles and responsibilities that will be done in collaboration between FMoH and FVERA are:
- Form a reliable vital events registration system at the national level
- Coordinate the means of notifying birth and death occurring in governmental and private institutes
- Conduct monitoring and evaluation to increase registration coverage
- Find donors and other stakeholders who potentially can provide technical and financial assistance
- Conduct a joint forum every three months, focusing on bilateral issues and strengthening the registration system
- Integrate a clear procedure at the national level to register death and reasons of death occurring at home and health facilities

Health facilities

- Complete vital events registration based on recording and reporting formats
- Conduct data quality assessments
- Provide training and sensitization programs

Focus Area 1.C: Strengthen health workforce capacity and motivation to collect, analyze, and use information at the frontline and program level

Intervention 1.C.1: Strengthen human resources for health capacity to effectively use ICTs

This intervention focuses on:

- Ensuring the M&E units at each levels of the health system are staffed with an adequate number and mix of M&E experts. It involves defining the level of M&E expertise required at each level of

the health system, revising the structure and employing the required experts. Collaboration with regional health bureaus, human resource directorates, and partners will be critical in realizing this initiative.

- Improving the capacity of health care providers, M&E personnel, and health managers at all levels on data management, and ensuring quality of information and use of information. It includes defining the HMIS/M&E capacity-building needs of health care providers, M&E personnel, and health managers with respect to the role they will play in the health system. This should be followed by developing training modules for the three categories of health professionals. It also intends to establish a platform to effectively communicate survey reviews, findings of surveys and other research, and best experiences to stakeholders, which could help in informing decision and policy makers.
- Incorporating training on routine health information system and M&E system of the health system in the pre-service curriculum of health professionals. It will help in creating understanding on the existing health information and M&E system of the health sector among the health professionals during their in-school trainings and practicums. Thereby, it will ensure that health professionals will use the existing systems appropriately while providing services. Collaboration with the Ministry of Education, universities, and professional associations will be of paramount importance in the whole process of realizing this initiative.
- Developing the ICT workforce in the health care system of Ethiopia by creating ICT-aware health information technicians, health informatics experts, physicians, and other health professionals. By developing such a workforce, it is possible to strengthen the sustainability of eHealth systems to be deployed in the country. Such a workforce learns and uses, with minimal training, the new electronic systems and could easily address minor faults in the systems, thereby reducing the burden for the implementer. Currently, regional health bureaus and hospitals in different parts of the country are hiring ICT professionals to support their overall ICT infrastructure, which includes the eHealth systems deployed there. When new electronic health systems are deployed, users of the system are provided training on how to use the system. However, to ensure the sustainability of the different electronic systems being deployed at the health facilities, we need to devise a way to equip the health workers with basic ICT knowledge on the usage of electronic health record systems.

Major activities

- Ensure adequate staffing of each level of the health system with appropriate M&E personnel

- Enhance HIS staff career development opportunities
- Improve the capacity of health professionals, M&E personnel, and health managers
- Ensure the pre-service curriculum includes training of health professionals on routine health information, eHealth, and M&E systems
- Establish training centers at regional health bureaus and at major hospitals
- Provide TOT training for those who will run the training centers

Intervention 1.C.2: Design and implement information workflows to maximize data use

Selecting and employing the best health data dissemination and presentation techniques is as important as identifying best health data collection, processing, and storage methods.

Major activities

- Assess the information needs of health workers at all levels
- Develop and implement workflows to maximize the availability and use health information for decision making and action
- Identify the types of health information and mechanisms for communication

Focus Area 1.D: Surveillance and response

As for all health care data, public health authorities need data collection, analysis, and dissemination systems to provide accurate, reliable, consistent, and complete information to evaluate existing resources, plan for the future, and introduce measures to anticipate problems before they arise. In public health, the Information Revolution focuses on strengthening integrated disease surveillance and response systems.

Intervention 1.D.1: Strengthen public health emergency management data quality and integrity

Poor-quality data can mislead. The entire process of data design, collection, management, analysis, and dissemination needs to be of high quality and integrity.

Major Activities

- Ensure the data collected is of sufficient detail to help inform and promote evidence-based policymaking at every level (i.e. disaggregated across dimensions based on relevance to the program or policy)

- Strengthen the disease surveillance system by introducing and expanding relevant data collecting tools such as cancer registries
- Review and revise the existing framework for quality assurance
- Introduce appropriate information technology to improve data timeliness
- Strengthen the disease surveillance system in the private health facilities
- Strengthen health workforce capacity and motivation to collect quality data

Intervention 1.D.2: Reinforce data transparency and openness

Many publicly-funded datasets, as well as data on public spending and budgets, are not available to other ministries or to the general public. All data on public matters and/or funded by public funds, including those data produced by the private sector, should be made public and ‘open by default’ with narrow exemptions for genuine security or privacy concerns. It needs to be both technically open (i.e., available in a machine-readable standard format so that it can be retrieved and meaningfully processed by a computer application) and legally open (i.e., explicitly licensed in a way that permits commercial and non-commercial use and re-use without restrictions).

Major Activities

- Develop an integrated, centrally managed electronic network that provides access to national, state, and local information systems
- Use a data system that helps to provide services to the public

Focus Area 1.E: Patient safety and response

Unfortunately, patient safety is compromised due to medicine safety problems that are commonly caused by medication errors, poor quality of the medicine, inherently unsafe drugs, communication failures (failures between patient/patient proxy and practitioners, practitioner and nonmedical staff, or among practitioners), patient management (improper delegation, failure in tracking, wrong referral, or wrong use of resources), and clinical performance (before, during, and after intervention). Drug safety problems are manifested through adverse drug reactions (ADRs), which may result in serious patient harm.

Improving the culture of safety within health care is an essential component of preventing or reducing errors and improving overall health care quality. A safety culture exists where staff within an organization have a constant and active awareness of the potential for things to go wrong. Both the staff and the organization are able to acknowledge mistakes, learn from them, and take action to put things right. Being open and fair means sharing information freely and treating staff fairly when an incident happens.

A key aspect of a patient safety systems is a culture that encourages clinicians, patients, and others to be vigilant in (1) identifying potential or actual errors, 2) encouraging a culture where the reporting of errors and safety issues facilitates learning and takes appropriate steps to mitigate harm, and (3) promoting a culture where one learns from errors, near misses, and other identified safety issues.

Monitoring and addressing medication errors, monitoring and ensuring drug quality, and monitoring and managing ADRs is critical and crucial. The ability to capture and measure patient safety is central to enabling clinicians to provide excellent care, improving patient outcomes, reducing infection rates, preventing serious adverse events, controlling near misses, and standardizing treatments using evidence-based medicine. Reporting patient safety incidents and prevented incidents provides the opportunity to ensure that the learning gained from the experience of a patient in one part of the country is used to reduce the risk of something similar happening to future patients elsewhere. It is a key to success for Ethiopia's national and local health care delivery system. Efforts are underway to improve patient safety in areas of drug use problems/ADR, monitoring drug reactions, prescription monitoring, drug utilization monitoring, and antimicrobial prescribing and use; however due to lack of strong, transparent incident reporting systems and well-documented evidence, it is not possible to quantify the full magnitude of the patient safety-related problems with certainty.

Intervention 1.E.1: Promote and build comprehensive patient safety culture that is open and fair for sharing information and ensuring lessons are learned

Activities

- Establish a national patient safety forum/team who will work hand-in-hand with the national quality forum
- Establish and strengthen a national drug advisory committee
- Adopt and standardize patient safety standards, definitions, checklists, guidelines, and survey tools
- Organize a national level TOT on patient safety and patient safety assessment
- Conduct regional level TOTs on patient safety and patient safety assessment
- Organize hospital level patient safety trainings
- Undertake hospital level baseline assessments on patient safety and patient safety culture
- Undertake health center level baseline assessments on patient safety and patient safety culture
- Produce a baseline patient safety culture report

Intervention 1.E.2: Strengthen and improve transparency of patient safety surveillance and patient safety incident reporting system

Activities

- Identify and agree on reportable incidents (adverse events, near-miss, or errors)
- Design, print, and distribute an incident register/logbook, reporting form, and related guidelines/protocols

- Establish a national adverse events, near-miss, and error reporting system and a database and learning center for reporting patient safety incidents.
- Design and deploy an interoperable patient safety/incident reporting system (adverse events, near-miss, or error) and a data exchange platform at HF level (hospitals and health centers), linked to the regional and national reporting and learning system for the reporting of patient safety incidents
- Report incidents (complication, adverse event, near-miss or, error) as they are recorded/reported by each department
- Investigate and analyze each observed or reported incident (complication, adverse event, near-miss or error)
- Prepare reports and submit them to an executive; prepare regular patient safety report twice a year

Intervention 1.E.3: Learn and share safety lessons and encourage staff to learn how and why incidents happen

Activities

- Organize root cause analysis (RCA), auditing, and data mining training course for professionals (national TOT)
- Organize an advanced RCA, auditing, and data mining training course (Regional TOT)
- Facilitate training at the facility level/hospital level
- Conduct annual review meetings on patient safety incidents at national, regional, facility/hospital level
- Conduct operational research/assessments on patient safety and patient safety culture

Intervention 1.E.4: Build leadership and knowledge to improve patient safety culture and incident reporting

Activities

- Ensure that all hospitals and health centers have appointed a safety manager
- Appoint a safety champion for each unit/department of each hospital/HC
- Organize special trainings on patient safety and patient safety data quality for hospital and HC leadership

- Institutionalize leadership Walk Rounds by hospital medical directors on patient safety and follow up meetings with the staff on weekly basis without interruption
- Organize awareness creation meetings on patient safety at hospital and health center level
- Institutionalize and strictly implement weekly meeting on patient safety at each department
- Organize in-country and out-of-country experience sharing tours

Roles and responsibilities

FMoH/RHB

- Play a lead role in coordinating applied research agendas on patient safety, focusing on enhancing knowledge, developing tools, and disseminating results to maximize the impact of patient safety systems among federal agencies, hospitals, universities, sub-national levels, and the private sector.
- Develop standard registries, reporting formats, and interoperable database and data interchange standard formats (standard formats for electronically encoding the data elements, including sequencing and error handling; data interchange standards can also include document architectures for structuring data elements as they are exchanged and information models that define the relationships among data elements in a message)
- Organize capacity-building training programs
- Establish a national interoperable pharmacovigilance database
- Investigate and aggregate reported incidents; give feedback to reporting institutions and regions
- Produce and disseminate annual patient safety report
- Strengthen/establish national drug advisory committee

Health Facilities (Hospitals and Health Centers)

- Establish comprehensive patient safety programs at all health care institutions; these should be operated by trained personnel within a culture of safety, specifically when involving an adverse event, medical errors, surgical errors, and near-miss detection and analysis
- Establish a patient safety incident reporting system and database and report accordingly
- Establish/strengthen the Drug and Therapeutic Committee (DTC)
- Appoint a safety manager/focal person

- Designate a safety champion in each unit; having a designated safety champion in every department and patient care unit demonstrates the organization's commitment to safety and may make other staff members feel more comfortable about sharing information and asking questions. Champions must have proper training, resources, and authority.
- Hospital leadership: provide leadership on patient safety, walk rounds on weekly basis without interruption. Senior leaders can demonstrate their commitment to safety and learn about the safety issues in their own organization by making regular rounds (executive walks) to discuss safety issues with the frontline staff.
- Hospital leaders who conduct executive walks should give feedback briefings to the teams
- Strictly follow weekly case team/unit meetings on patient safety
- Build awareness in hospital/HC of patient safety
- Organize training programs in patient safety, incident reporting, quality of care
- Make patient safety training available for staff with specific responsibility for safety
- Conduct a baseline assessment on patient safety culture at hospitals, HCs, and HP, and produce a baseline report
- Investigate thoroughly and analyze each observed complication/reported incident
- Prepare and submit to the executive regular (twice per year) patient safety reports as recorded by each department. The report may include type of incidents: mortality and root cause analysis report (what, where, why, recommendations, and detailed improvement activities)

Health Professionals

- Identify areas prone to errors, this will help design a proactive, systems-approach intervention for minimizing the opportunities for errors and can prevent adverse events
- Routinely report incidents and near misses: this is the key to effective reporting. Unless staff members trust that the organization will use the information for improvement and not to blame individuals, they will be reluctant to report incidents.
- Follow standard operating procedures and update skill and knowledge

Focus Area 1.F: Patient engagement and awareness raising

Intervention 1.F.1: Raise public awareness through ICT

Citizens have a right to receive relevant information about health conditions and services and the FMoH has a responsibility to make this information available. This intervention is about allowing people to get the latest information about health and health-related activities throughout the health sector that will impact their health conditions. The public should be aware of the importance, usage, and mechanisms for communication of health information. One of the basic objectives for the health system of the country is to make information available at the individual or community level, so that the public is informed and can make timely decisions about health related topics.

The FMoH has been working actively in this respect by using a variety of communication media to disseminate health information and to make the public aware of how to maintain good hygiene and general well-being. However, this work could be strengthened and made more effective by employing different ICTs that are available. One example is the FMoH is setting up an audio studio on premises of the Ministry that utilizes weekly air time on the Ethiopian Broadcasting Corporation (EBC) to communicate health messages.

Major Activities

- Identify best technologies and mediums to disseminate health information to the public effectively
- Identify major topics which needed to be disseminated to the public
- Incorporate ICTs into health awareness campaign strategies to increase coverage and effectiveness
- Follow up and measure the effectiveness of the methodologies
- Continuous follow up in new technologies and effective practices elsewhere and adapting them to Ethiopia specifically

Intervention 1.F.2: Increase transparency of information flows and promote accountability

A transparent system makes information available to patients and their families enabling them to make informed decisions (e.g. when selecting a hospital, when choosing among alternate treatments). In the Ethiopian health care system, so far there is no a standard guideline on how to make health information transparent. Transparency in health care appears to be an inevitable evolution in the information and consumer age.

It is also critical to identify and assess the various accountability roles that health sector actors play and to ensure that these roles are made known to the public. Each health sector actor has a role in accountability. These actors include the FMoH, funding agencies, regional government officials, non-governmental organizations, hospital boards, professional associations, unions, health care providers (facilities and individuals, public and private), and international donors.

Major Activities

- Create awareness on the need and importance of health information transparency
- Gather best practices
- Develop a standard guideline on the creation of a transparent health system
- Identify the issues that need to be transparent
- Implement the strategy

Pillar 2: Digitalization and scale-up of priority health information systems

In the past two decades during the execution of HSDP1, HSDP2, HSDP3, and HSDP4, the FMoH has implemented different technologies and electronic systems. These contribute to a national health information architecture and are aimed to streamline the efficiency and effectiveness of healthcare delivery from the community up to the national level. These electronic information systems have been categorized into national HIS, standards-based digital registries, and point of service HIS. These include EMR, eHMIS, eHRIS, IFMIS, LMIS, LIS, RIS, Telemedicine and Tele-education, and mHealth, among others. The strengths and weaknesses of each system will be assessed according to its ability to meet the current and upcoming needs of the health system. Gaps will be addressed through improvements and modifications and incompatible systems will be replaced. The Golden Initiatives implemented by FMoH, agencies, RHBs and partners are described below.

Focus Area 2.A: National health information systems

Intervention 2.A.1: Electronic health management information system (eHMIS)

The eHMIS is the automation of the health management information system of the country. It is used to modernize the health data collection, organization, analysis, and management of the health information system. Currently the health management information system of the country is half paper and half electronic based. Therefore, the Ministry would like to deploy this electronic system throughout the nation that will thoroughly shift the manual based system into digital. Eventually, we will ensure the one channel reporting system at health premises.

Intervention 2.A.2: Electronic integrated financial management information system (eIFMIS)

This financial system is a web based system and accessible over a wide area network or LAN, depending on the accessibility of the client from the main server hosting the application. This application helps FMoH, agencies, RHBs, all health facilities, and other responsible donors to distribute the budget and manage expenditures in a timely basis in line with the accomplishment of tasks or activities.

Intervention 2.A.3: Health geographic information system (HGIS)

A geographic information system or geographical information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. Geographic information systems, remote sensing (RS) satellites and other environmental observing technologies are providing researchers with the tools and the data to make clear the geographic relationships between environmental habitats of disease vectors and agents and the occurrence of disease. The responsible government bodies, health program managers, and other individuals can effectively analyze the incidence and direct cause of illness if they get information directly from the community spatially. GIS and RS have the capability to gather data to assess outbreaks of diseases, pathogens, and environmental contaminants that adversely affect human health and watch and model environmental and habitat changes. Therefore, FMOH has considered GIS as one big eHealth system that must be scaled up in the health sector from the federal to the community level.

Intervention 2.A.4: Electronic laboratory information system (eLIS)

The eLIS is a nationwide laboratory service with the support of a well-developed, customized, quality, and cost-effective electronic system. It is defined as a computer information system that manages laboratory information for all the laboratory disciplines such as clinical chemistry, hematology, microbiology, etc. Laboratory information is used for sending laboratory test orders to the instruments through its instrument interfaces, tracking those orders, and then capturing the results as soon as they become available.

Intervention 2.A.5: Electronic regulatory information system (eRIS)

An electronic regulatory information system automates the current paper-based regulatory information system in the country and provides integrated and centralized licensing-related activities including the issuing, renewal, suspension, and revocation of health sector licenses.

Intervention 2.A.6: Health data depot (HDD)

The HDD establishes a common digital working environment for all eHealth applications and facilitates data exchange between different electronic systems based on data standardizations. This will make data exchange and integration very efficient. HDD is a system that is used to collect, aggregate, and analyze giant health data stores, coming from various sources of electronic health applications and establishing one central database. The data will be archived to the central database and will help users extract information using various data mining techniques and tools to depict the historical trends of the health care delivery system. Eventually, this accumulated information and knowledge will help the FMOH to retrospectively assess the state of the health system and revise the health policy of the country.

Major activities

- Analyze different health data standards and recommend best alternative (Data Dictionary, HL7, DICOM Standards, etc.)
- Identify the major challenges to the current system
- List the best solutions to address the identified problems
- Select best solutions
- Customize the system based on the current system
- Conduct software usability testing
- Select a demonstration site based on the prepared checklist by HITD and other responsible directorates
- Deploy the system at the demonstration sites
- Collect feedback from demonstration sites and make amendments
- Scale up the system
- Prepare end user, technical, and other relevant documentation related to the system
- Continual follow up, support, and evaluation

Responsible Stakeholders

- Federal Ministry of Health
- Agencies
- Regional Health Bureaus
- Zonal Health Offices
- Woreda Health Bureaus
- Hospitals and health centers
- Partners
- Private companies
- MCIT and other ministries

Intervention 2.A.7: Data presentation tools and techniques

Many factors could be mentioned that undermine evidence-based decision making in the health system of Ethiopia. The failure to present data to end users and decision makers in user friendly, accessible formats affects the ease of using data in the decision-making process.

Many of the eHealth systems implemented in the country are not robust enough to present data or information in an easy and suitable manner so that the end users (the public), managers, and decision makers can make informed and timely decisions. This is one of the constraints that make the system users reluctant to fully depend on it.

The Federal Ministry of Health has identified the need to devise mechanisms that present health data to different users in a helpful and timely manner.

Major Activities

- Identify existing gaps and constraints to data presentation
- Identify best methodologies and techniques in data presentation
- Adopt the best techniques to the Ethiopian context

Intervention 2.A.8: Electronic human resource information system (eHRIS)

The main objective of eHRIS is to provide managers with appropriate knowledge, information, and tools to assist them in the management and development of their staff for effective delivery of service. eHRIS includes data for personnel, payroll, and HR-related information. eHRIS is planned and developed to be a web-based application that helps to harmonize the nationwide human resource information systems. In time, information that is generated from eHRIS can eventually be used for budget management, people management, learning development, workforce planning, and other important purposes.

Focus Area 2.B: Standards-based digital registries

Intervention 2.B.1: Master facility registry (MFR)

A Master Facility Registry (MFR) is a foundational component of a national health information system (HIS) architecture that allows government agencies and partners to manage and share common health facility identifiers and related metadata such as location, facility type, available equipment, and photos. The use of shared facility identifiers are a prerequisite to harmonizing data across information systems and essential to understanding the distribution of disease prevalence, health services, and resource consumption and allocation throughout the health system. Without an authoritative source of health facility information, systems collect and store separate lists of health facilities with divergent levels of standardization, quality, and completeness, leading to incompatible datasets that are difficult to harmonize.

The Master Facility Registry (MFR) will act as the central authority to collect, store, and distribute an up-to-date and standardized set of facility data. The resulting standardized and current facility dataset stored in the registry is called a master facility list (MFL). While these concepts are closely related, a facility service can be understood as the technology that manages and shares facility data, and an MFL is the standardized data stored in the tool.

Currently, stakeholders in Ethiopia's health system use multiple, competing lists of health facilities leading to incompatible datasets, but the building blocks are in place to converge on a single, authoritative health facility list. An open-source, standards-based MFR could be initialized in Ethiopia that builds off existing datasets and processes (ESPA+, SARA, eHMIS, etc.) and sets the stage for sustainable governance, integration, and broad adoption of standard facility identifiers. Upon successful integration of the MFR with other information systems, the FMoH will be able to change facility data once in the central MFR, and the changes will be updated throughout all connected information systems. Other

countries, such as Tanzania, Kenya, and Rwanda have had success implementing similar services and can serve as examples to guide the planning process in Ethiopia.

The goal is to implement the open-source Master Facility Registry (MFR) at the National Data Center with up-to-date facility data (from SPA+ and other sources) to enable interoperability of facility-based data across the health system.

Major Activities

- Investigate the existing system
- Identify the major challenges
- List the best solutions to address the identified problems
- Select best solutions
- Customize the system
- Conduct software usability testing
- Select demonstration site based on the prepared checklist by HITD and other responsible directorates
- Deploy the system at the demonstration sites
- Collect feedback from demonstration sites and make amendments
- Scale up the system
- Prepare end-user, technical, and other relevant documentation related to the system
- Continual follow up, support, and evaluation

Responsible Stakeholders

- Federal Ministry of Health
- Agencies
- Regional Health Bureaus
- Zonal Health Offices
- Woreda Health Bureaus
- Hospitals and health centers
- Partners
- Private companies
- MCIT and other ministries

Intervention 2.B.2: Data dictionary and terminology management service (TMS)

A terminology management service (TMS) is a shared resource to host, curate, and customize data

dictionaries, which are libraries of definitions for health data and indicators. A TMS supports distributed governance of published content, as well as facilitates harmonization of data across disparate sources and information systems. Currently, there is no way for the FMoH and other coordinating partners to publish terms and indicators in a way that lets them be harmonized, locally customized, and easily pulled into common on-the-ground tools. Upon successful integration of the TMS, the FMoH will be able to coordinate national level indicators and terminologies across disparate health programs (health extension program, low-level facilities, referral hospitals, and HMIS indicators), to push new and edited terminology changes to relevant stakeholders and other integrated HIS systems in a timely manner, as well as develop local capacity and governance around terminology needs for Ethiopia. The approach used in Ethiopia will utilize an open-source solution based on similar solutions in other Sub-Saharan countries and will begin by developing data dictionaries based on the existing HMIS indicator definitions and the adapted ICD-10 disease classifications.

Major activities

- Analyze the current environment for indicator and data definitions
- Prepare data dictionary based on HMIS indicator definitions and ICD-10 disease classifications
- Assess existing governance models for HMIS indicator definitions
- Configure and deploy the TMS in Ethiopia beginning with the developed data dictionaries
- Support the validation of developed data dictionaries (e.g., ICD-10 disease classification pilot)
- Integrate the TMS with key HIS
- Support planning for the expansion of the TMS, integration into other HIS, and development of additional data dictionaries

Focus Area 2.C: Point of service health information systems

Intervention 2.C.1: Electronic medical/health record (EMR/EHR)

The Electronic Medical Record is a computerized patient tracking and patient caring system. To bring the Information Revolution to ground through ICT, the health sector needs to have comprehensive and robust medical recording systems in all health facilities which captures all patient histories and related transactions confidentially. This will give significance to the HMIS because a routine patient record will be available in the EMR. Therefore, the Ministry intends to implement EMR in all hospitals and health centers to convert the entire medical recording system from manual to digital.

Intervention 2.C.2: Telemedicine and tele-education (TM, TE)

In order to address the challenges of accessible and quality health care delivery, and also to drastically increase the number and quality of medical professionals in the country, the FMoH would like to scale up the implementation of various TM and TE initiatives which make possible the success of the Health Sector Transformation Plan (HSTP).

Major Activities

- Roll out telemedicine services to all hospitals in the country

Intervention 2.C.3: Mobile health (mHealth)

This intervention is the use of mobile phones and other wireless technology in the health system. Mobile phones can be used for referrals, training and education, supply chain management, data exchange, decision support during patient consultations, and information reference. Using mobile coverage and expansion as an opportunity, mobile phones and technologies can also be considered as a major mechanism to bring health services, education, and data exchange to the community living in both rural and urban areas. The Ministry is eager to scale up and explore innovative mobile health technologies that help create accessible, quality, and equitable health services.

Intervention 2.C.4: Electronic community health information system (eCHIS)

The Health Extension Program (HEP) is at the heart of Ethiopia's health system, which has been delivered by 16 health packages together with the Family Folder. HEP is an effort towards the development of a family-oriented approach to the solving of health problems and to the organization of health care services. It is the health information management system that adopted the family as a unit for provision of health services and maintenance of records. HEP has been delivered to the community using paper, and the use of paper combined with limited capacity at health posts limits data recording, collecting, organizing, handling, and managing of Family Folders as a whole. Therefore, to mitigate these challenges and strengthen this system, we can reach out to many households, digitize this information in eCHIS, and plug it into the national eHealth systems, making broader use of it. Thus, Health Extension Workers (HEW) are the major and frontline users of this system. By providing the Health Extension Workers a modern and appropriate electronic system, we can make the health system delivery and equity more efficient and also help to address one of the goals of HSTP that is primary health care coverage.

Intervention 2.C.5: Electronic logistics management information system (eLMIS)

The eLMIS is an automation of the Supply Chain Management System (SCMS) of the health sector. It will facilitate and manage the end-to-end process of SCMS, such as usage of all medical equipment and drugs, procurement, distribution, functional status of medical devices, and drug stock-out including expiration dates. Using this system, it is also possible to determine which health facilities are partially equipped, fully equipped, and not-equipped. Therefore, by deploying this electronic system we can create non-abused, fair distribution of medical equipment and drug resources and monitor their condition for maintenance and/or replacement and future planning.

Selecting and Establishing Information Revolution Demonstration Sites

The main objectives of the Information Revolution demonstration sites are to test and refine approaches, to inform scale-up plans through identification of best practices and lessons learned, and to evaluate progress towards achieving the goals of the Information Revolution. The demonstration sites will focus on how the Information Revolution focus areas and interventions apply to and benefit health workers and patients at the front line.

While demonstration sites will be selected at multiple levels of the health system (e.g. secondary and tertiary hospitals, regional health bureaus), the Connected Woreda sites will serve as the primary targets for demonstrating the value of the Information Revolution at the ground level. Specifically, the Connected Woredas will be used to test and refine how, where, and for whom the cultural change and data use objectives of the Information Revolution will be applied to frontline workers, while providing actionable information to stakeholders at higher levels of care or administration. The woreda focus incorporates the primary health care unit, consisting of woreda health offices, general hospitals, health centers and health posts, which aligns with the transformation agenda priority of leveraging investments to improve quality and equity of service delivery, in part through optimizing data use by frontline workers.

The demonstration site selection criteria will be developed and tailored to the purpose of conducting the Information Revolution agenda. As the Revolution focuses on model site creation, the different contexts should be considered to ensure the full agenda is achieved. The availability of ICT infrastructure, connectivity, the status of HMIS and M&E systems in the region and administrative structures will be used to define regional context. Demonstration site selection criteria will also consider the minimum requirements of each administrative and service unit in order to enable successful implementation of the Information Revolution agenda.

The Connected Woreda demonstration sites will be carefully selected according to relevant criteria. At these demonstration sites, eHIS interventions coupled with training and capacity building for health workforce professionals will allow for high quality data to be used to drive improvements in health service delivery within the selected woredas. Success within these demonstration sites will help to make the case for investments to scale-up the Connected Woreda model nationally. A detailed design and implementation strategy for the demonstration of Connected Woredas will be developed in alignment with Information Revolution plan priorities and focus areas.

Documenting the lessons from the Connected Woreda and other demonstration sites, the Information Revolution agenda will be rolled out to the rest of the woredas in phases. Considering the fact that implementation of any new system is certain to involve different challenges in different contexts and optimal utilization of resources, woredas that are selected for the woreda transformation agendas and all health facilities within will be considered for the demonstration sites.

Major activities

- Design the strategic implementation plan for demonstration sites for each level of the health system, including the Connected Woreda
- Develop selection criteria for each type of demonstration site, including the Connected Woreda
- Select demonstration sites
- Implement the strategic implementation plan
- Conduct monitoring and evaluation activities and document lessons learned to assess successes, challenges, and to inform and refine scale-up plans
- Develop scale-up plans
- Scale up to the other sites

Governance of the Information Revolution

Coordination of HIS activities undertaken by various stakeholders is critical to the achievement of the Information Revolution objectives. To facilitate this coordination, the MOH will establish a governance structure for the national HIS and Information Revolution that will ensure alignment of HIS activities with health system strategies, provide leadership and oversight of the execution of the Information Revolution, oversee development and adoption of standards and guidelines for eHealth implementation, direct HIS investments towards the iterative development of a national HIS architecture, manage communications of the Information Revolution and other HIS activities, and enable ongoing dialogue and coordination with other constituencies. The stakeholders involved include governmental agencies, including statistical agencies such as the Central Statistical Agency (CSA), non-governmental organizations, the private sector, civic societies, and prominent individuals.

The governance mechanism will also promote the design and implementation of HIS solutions that strengthen the cultural transformation in data use and local capacity through the establishment of principles for HIS development. The principles will encourage local ownership of solutions and data, building for scale-up and sustainability, protection of patient privacy and confidentiality, adoption of standards-based and open-source solutions, and designing solutions with the input of patients and users.

Major Activities

- Formalize governance structure that encompasses all health system levels
- Establish and coordinate intra- and inter-sectoral linkages
- Monitor and evaluate the implementation of the HIS strategic plan
- Prepare and obtain signature of the partnership protocols
- Monitor and evaluate of the implementation of the partnership protocols
- Set standards, guidelines and procedures on the procurement, design and implementation of HIS infrastructure and solutions
- Set ethical standards in health information access to protect patient privacy and security
- Determine and carry out capacity building priorities and mechanisms to enable sustainable operation of HIS solutions
- Direct selection and implementation of Information Revolution demonstration sites

Table 2: Key Stakeholders for Governance of Information Revolution

Group	Responsibilities	Composition
Health Sector leadership	<ul style="list-style-type: none"> • Gives overall direction • Secures resources • Assists with resolution of major issues, problems, conflicts, and other challenges • Sets the overall vision and strategic direction • Guides the vision and planning process • Approves and endorses the national eHealth vision and carries out strategic recommendations 	High level management, including the Minister, state minister, or council of directors
Steering committee	<ul style="list-style-type: none"> • Produces detailed Information Revolution (IR) implementation plan • Makes decisions at key stages of the project • Makes follow up on the implementation of the IR • Oversees the overall progress of the IR plan and approves changes to scope or approach 	Representatives from the concerned directorates of the FMoH, including PPD, HITD, etc.
Stakeholders	<ul style="list-style-type: none"> • Own and incorporate the IR plan into their plan and work towards its success • Provide recommendations and guidance on the implementation of the IR • Review the implementation of the IR and provide feedback • Asses opportunities and gaps of the IR • Provide recommendations 	Ministry of Education, Ministry of ICT, INSA ,health professional associations, academic & research institutions, regional health bureaus, private health institutions, health ICT vendors, media
Partners	<ul style="list-style-type: none"> • Provide assistance (technical, financial, etc.) during the development and implementation of the IR • Provide insight into the system and advice at all the stages of the implementation process • Provide lessons from similar international programmes and projects 	NGO's, development partners, international organizations, etc.

Performance Measures

Table 3: Information Revolution Performance Measures

Pillars	Focus Areas	Interventions	Performance Measures
Pillar 1: Cultural transformation for health data use	1.A. Data for service delivery, coverage, and equality	1.A.1. Strengthen availability, readiness, quality, use, and transparency of service data	<ul style="list-style-type: none"> · Conduct facility census every 3 years · Conduct facility survey every year · 100% of expected reports from reporting units complete and on-time · Produce a health system performance assessment report · Increase proportion of health facilities that conduct lots quality assurance sampling (LQAS) from 36% to 85% · 100% implementation of community score card
		1.A.2. Increase the availability and quality of service coverage data	<ul style="list-style-type: none"> · Produce annual report on the state of inequality in service coverage using routine facility service data · Increase woredas performing equity analysis as per standard to 90% · Increase health facilities that implement measurement of service quality to 90%
		1.A.3. Create data comparability and synthesis across multiple information sources	<ul style="list-style-type: none"> · Establish functional PMT in all facilities · Develop data access protocols for users
		1.A.4. Improve population data and coverage estimates	<ul style="list-style-type: none"> · Improve population measurement by producing annual small area estimate reports
	1.B. Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)	1.B.1. Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)	<ul style="list-style-type: none"> · Increase coverage of birth registration · Implement standardized death report with all public and private health providers · Publish annual vital registration statistics report disaggregated to woreda-level including cause of death

Pillars	Focus Areas	Interventions	Performance Measures
	1.C. Strengthen health workforce capacity and motivation	1.C.1. Strengthen human resources for health capacity to effectively use ICTs	· Establish health information, ICT, and M&E competency requirements for each cadre of health workers
	to collect, analyze, and use information at the frontline and program level	1.C.2. Design and implement information workflows to maximize data use	· Implement at least one information workflow to maximize data use for a priority health system challenge
	1.D. Surveillance and response	1.D.1. Strengthen public health emergency management data quality and integrity	· Produce two burden of diseases analysis reports during the HSTP period
		1.D.2. Reinforce data transparency and openness	· Publicly release at least one additional public health dataset on a standard platform supporting digital and other formats
	1.E. Patient safety and response	1.E.1. Promote and build comprehensive patient safety culture that is open and fair for sharing information and ensuring lessons are learned	· Develop patient safety standards and guidelines, and conduct national, regional and hospital level patient safety baselines and trainings
		1.E.2. Strengthen and improve transparency of patient safety surveillance and patient safety incident reporting system	· Implement a national patient safety incidence reporting system · Produce patient safety reports twice each year
		1.E.3. Learn and share safety lessons and encourage staff to learn how and why incidents happen	· Conduct annual patient safety review meetings at national, regional, and facility level
		1.E.4. Build leadership and knowledge to improve patient safety culture and incident reporting	· Appoint and capacitate a safety manager at 100% of hospitals and health centers
	1.F. Patient engagement and awareness raising	1.F.1. Raise public awareness through ICT	· Incorporate ICTs into health awareness campaign strategies to increase coverage and effectiveness
		1.F.2. Increase transparency of information flows and promote accountability	· Develop and implement a health sector transparency and accountability guideline

Pillars	Focus Areas	Interventions	Performance Measures
Pillar 2: Digitalization and scale-up of priority health information systems	2.A. National health information systems	2.A.1. Electronic health management information system (eHMIS)	· Implement FMOH-governed eHMIS in 100% of health administration offices (regions, zones, woredas) and in 100% of public and private health facilities
		2.A.2. Electronic integrated financial management information system (eFMIS)	
		2.A.3 Health geographic information system (HGIS)	· Design and implement HGIS solution
		2.A.4. Electronic laboratory information system (eLIS)	· Implement eLIS solution throughout the country
		2.A.5. Electronic regulatory system (eRIS)	· Design and implement eRIS solution
		2.A.6. Health data depot (HDD)	· Implement a data warehouse hosted by the MOH and integrated with multiple priority data sources · Achieve interoperability of priority data sources in alignment with the national health information enterprise architecture
		2.A.7. Data presentation tools and techniques	· Design and implement infrastructure to enable the presentation and dissemination of priority sets of health information
		2.A.8 Electronic human resource information system (eHRIS)	· Implement eHRIS in all regions of the country
	2.B. Standards- based digital registries	2.B.1. Master facility registry (MFR)	· Establish authoritative master facility registry governed by the MOH · Integrate and harmonize facility identifiers with the MFR in the eHMIS and other priority HIS
		2.B.2. Data dictionary and terminology management service (TMS)	· Produce harmonized data dictionaries for the HMIS, disease classifications, and other priority datasets
	2.C. Point of service health information systems	2.C.1. Electronic medical/health records (EHR/EMR)	· Design and implement EMR solution, develop implementation plan, and initiate rollout into public hospitals and health centers
		2.C.2. Telemedicine and tele-education (TM, TE)	· Implement telemedicine in 100% of public hospitals

Pillars	Focus Areas	Interventions	Performance Measures
		2.C.3. Mobile health (mHealth)	· Design and implement mHealth solution
		2.C.4. Electronic community health information systems (eCHIS)	· Design and implement eCHIS solution throughout the country
		2.C.5. Electronic logistics management information system (eLMIS)	· Implement eLMIS solution throughout the country

Action Plan

Table 4: Information Revolution Action Plan

1	Pillar 1: Cultural transformation for health data use	Yearly Target					Estimated USD
		yr 1	yr 2	yr 3	yr 4	yr 5	
1.A	Focus Area 1.A: Data for service delivery, coverage, and equity						
	Interventions and Activities						
1.A.1	Strengthen the availability, readiness, quality, use, and transparency of service data						
	Identify data elements to be collected during the census						
	Conduct facility census every 2-3 years			X			3,000,000
	Conduct facility survey every year		X	X	X	X	600,000
	Produce regular reports	X	X	X	X	X	-
	Triangulate the data with different sources and produce analytical reports	X	X	X	X	X	-
	Present data for decision makers and users at every level	X	X	X	X	X	-
1.A.2	Increase the availability and quality of service coverage data						-
	Prepare and implement integrated data management protocol		X				-
	Strengthen implementation of HMIS in private health facilities						-
	Conduct regular HMIS mentoring to health facilities		X	X	X	X	-
	Strengthen routine data quality assessment at all levels						-
	Conduct regular HMIS mentoring to health facilities		X	X	X	X	454,240
	Training		X	X	X	X	617,500
	Conduct RDQA		X	X	X	X	220,000
	Strengthen health quality and equity monitoring						-
	Institutionalize measurement mechanism for service quality improvement		X	X	X	X	-
	Integrate service quality measurement in to M&E system		X	X	X	X	-

	Produce state of inequality report		x	x	x	x	-
	Strengthen regions and woredas to conduct action oriented research/ M&E						-
	Conduct training on operational research		x	x			217,470
	Conducting equity-oriented study/survey every year						-
	Conduct baseline assessment and produce initial report		x	x	x	x	81,420
	Develop standard for evaluation		x				-
	Institutionalize evaluation methodologies						-
	Conduct workshop on evaluation methodologies		x	x			346,815
1.A.3	Create data comparability and synthesis across multiple information sources						-
	Improve advanced analytical skills (in-depth analysis, data mining)						-
	Conduct training for data managers		x	x			2,098,866
	Mentor staff	x	x	x	x	x	-
	Conduct regular self-assessment (PMT establishment & functionality)		x	x	x	x	-
	Enhance accountability scorecard at all levels		x	x	x	x	-
	Train staff		x	x			1,761,125
	Strengthen decision support system		x	x	x	x	-
	Develop integrated platform						-
	Develop data access protocols for users		x				-
	Strengthen geospatial data generation, analysis, and use		x	x	x	x	-
	Improve data triangulation mechanism from different data sources		x	x	x	x	-
	Pool health and health-related studies raw data		x	x	x	x	-
1.A.4	Improve population data and coverage estimates						-
	Strengthen home-based records and improve ownership of community data						-
	Design different systems for urban and pastoral communities						-

	Promote biometric-type recording system for mobile population								-
	Establish community name-based recording and tallying mechanism								-
	Establish community jury to facilitate performance review		x	x	x	x			-
	Develop standard HDA recording and reporting tools to ensure compatibility with CHIS		x	x	x	x			-
	Conduct capacity-building training of HDA on M&E		x	x	x	x			-
	Ensure competency on data literacy		x	x	x	x			-
	Produce small area estimate								-
	Adopt manual for the small area estimate		x	x	x	x			-
	Train staff		x						65,250
	Conduct estimate survey		x	x	x	x			81,420
1.B	Focus Area 1.B: Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)								-
1.B.1	Strengthen programmatic birth and establish linkage with civil registration and vital statistics system (CRVS)								-
	Develop standard form for death report (adopt international certificate of death for public and private health facilities)	x							-
	Conduct orientation and disseminate the standardized death report form to all public and private health care providers, VHSG, and local authorities, and ensure providers know how to fill the Standard Death Report		x	x					979,225
	Develop tool for assessing completeness of vital registration at national and sub-national levels.	x	x						402,720
	Conduct training on vital data processing and analysis at all levels of the health system		x	x					-
	Publish annual vital registration statistics, disaggregated to woreda (including causes of death), and distribute to all concerned institutions at central, regional, and woreda levels in collaboration with VERA		x	x	x	x			10,000
	Introduce and provide training in ICD-10 coding and verbal autopsy		x	x					-
1.C	Focus Area 1.C: Strengthen health workforce capacity and motivation to collect, analyze, and use information at the frontline and program level								-

1.C.1	Strengthen human resources for health capacity to effectively use ICTs							-
	Ensure adequate staffing of each level of the health system with appropriate M&E personnel							-
	Train HIT professionals	x	x	x	x	x		6,412,500
	Enhancing HIS staff career development opportunities							-
	Improve the capacity of health professionals, M&E personnel, and health managers		x	x				-
	Ensure the pre-service curriculum includes training of health professionals on routine health information, eHealth, and M&E system							-
	Conduct workshop on curriculum revision		x					14,510
	Strengthen training centers at regional level							-
	Provide equipment (computer, LCD, and furniture)		x					675,750
	Provide Training of Trainers trainings		x					27,299
1.C.2	Design and implement information workflows to maximize data use							-
1.D	Focus Area 1.D: Surveillance and response							-
1.D.1	Strengthen public health emergency management data quality and integrity							-
	Ensure that data collected is of sufficient detail to inform and promote evidence-based policy making at every level (e.g., disaggregated across dimensions based on their relevance to the program, policy, or other)	x						-
	Strengthen the disease surveillance system by introducing and expanding relevant data collecting tools such as cancer registries	x	x					-
	Review and revise the existing framework for quality assurance	x	x					-
	Introduce appropriate information technology to improve data timeliness	x	x					-
	Strengthen the disease surveillance system in private health facilities		x	x				-
	Strengthen health workforce capacity and motivation to collect quality data	x	x	x	x	x		-
1.D.2	Reinforce data transparency and openness							-
	Develop an integrated, centrally managed electronic network that provides access to national, state, and local information systems	x	x					-

	Use a data system that helps to provide services to the public		x	x	x	x		-
1.D.3	Advance information-use culture							-
	Make the timing of evidence generation strategic so that timely, quality, and relevant data needed to fulfill needs at country, regional, and global levels will be used		x					-
	Strengthen health workforce capacity and motivation to collect, analyze, and use data		x					-
	Determine data use and dissemination standards		x					-
	Support selected zones to meet a minimum set of surveillance capabilities		x					-
	Redesign program-specific data systems into integrated systems		x					-
	Implement a data management system that meets local needs in systematic collection, analysis, and monitoring of standardized baseline data		x					-
	Employ technical assistance to ensure a high standard of data analysis, dissemination, and communication		x	x	x	x		-
1.E	Focus Area 1.E: Patient safety and responses							-
1.E.1	Promote and build comprehensive patient safety culture that is open and fair for sharing information and ensuring lessons are learned							-
	Establish national patient safety forum/team that will work hand-in-hand with the national quality forum		x					-
	Establish/strengthen national drug advisory committee	x	x	x	x	x		-
	Adopt/standardize patient safety standards, definitions, checklists, guidelines, survey tools	x	x					-
	Organize national level TOT on patient safety and patient safety assessments		x					33,526
	Organize regional level TOT on patient safety and patient safety assessments		x					407,975
	Conduct hospital-level patient safety training		x	x	x	x		-
	Undertake hospital-level baseline assessment on patient safety and patient safety culture and produce baseline report of referral hospitals for FMoH		x					34,440
	Undertake hospital-level baseline assessment on patient safety and patient safety culture and produce baseline report by hospital		x					-

1.E.2	Strengthen and improve transparency of patient safety surveillance and patient safety incident reporting system							-
	Identify and agree on reportable incidents (e.g., adverse event, near miss, error)		x					-
	Design, print, and distribute register/logbook, reporting form, related guidelines/protocols		x					7,800
	Establish reportable incidents reporting system, database, and learning center for reporting patient safety incidents.		x					-
	Design and deploy interoperable patient safety incidents (adverse event, near miss, and error) reporting system and data exchange platform at health facilities (hospitals and health centers) level and link to the regional and national reporting and learning system for reporting patient safety incidents		x					-
	Record and report incident (complication, adverse event, near miss, or error) as it is recorded/reported by each department		x	x	x	x		-
	Investigate and analyze each observed or reported incident (complication, adverse event, near miss, or error)		x	x	x	x		-
	Prepare and submit regular patient safety reports to executive - twice a year		x	x	x	x		-
1.E.3	Learn and share safety lessons, and encourage staff to learn how and why incidents happen							-
	Organize root cause analysis (RCA) and auditing training course for professionals (National TOT)		x					-
	Organize root cause analysis (RCA) and auditing training course for professionals (Regional TOT).		x					-
	Hospital-level training on RCA and clinical audit		x					-
	Conduct annual review meetings on patient safety at:							-
	National level		1	1	1	1		100,520
	Regional level		1	1	1	1		250,000
	Facility level		2	2	2	2		-
	Conduct operational research/assessments on patient safety and patient safety culture		x	x	x	x		-
1.E.4	Build leadership and knowledge to improve patient safety culture and incident reporting							-
	Ensure that all hospitals and health centers have appointed a Safety Manager		x	x	x	x		-
	Appoint a Safety Champion for each unit/ department of each hospital/HC		x	x	x	x		-

	Organize special trainings on data quality and patient safety for hospital and HC leadership		x	x	x	x	-
	Institutionalize Leadership Walk Rounds by hospital Medical Director on patient safety and follow up meetings with the staff on weekly basis without interruption		x	x	x	x	-
	Organize awareness creation meetings on patient safety at hospital and health center level		x	x	x	x	-
	Institutionalize and strictly implement weekly meeting on patient safety at each department		x	x	x	x	-
	Organize in country and out of country experience-sharing tours		x	x	x	x	-
1.F	Focus Area 1.F: Patient engagement and awareness raising						-
1.F.1	Raise public awareness through ICT						-
1.F.2	Increase transparency of information flows and promote accountability						-
2	Pillar 2: Digitalization and Scale-up of Health Information Systems	Yearly Target					Estimated USD
		yr 1	yr 2	yr 3	yr 4	yr 5	
-	ICT infrastructure assessment						50,000
	Conduct a review on the existing ICT infrastructure to implement the eHealth initiatives	x	x				
	Produce a list of ICT equipment and infrastructure needs	x	x				
-	ICT infrastructure procurement and deployment						205,612,300
	Deploy LAN/WAN at 50% of HCs, hospitals, universities, WorHO, ZHB, RHB, agencies and FMoH	x	x				
	Produce RFP/bid document	x	x				
	Float bids	x	x				
	Procure the items	x	x				
	Deploy the items	x	x				
	Work with ETC to lay telecom infrastructure	x	x				
	ICT training for HEWs, HIT personnel, physicians, etc.						10,191,000
	Recruit personnel	x	x				
	Provide the necessary training	x	x				
2.C.1	Implement Electronic Medical/Health Record (EMR/EHR) at all hospitals and health centers						23,809
	Evaluate the existing system	x					
	Identify gaps (software, resource, personnel)	x					
	Customize the existing/new application	x					
	Provide training to end users	x	x				

	Procure ICT equipment	x	x				
	Deploy						
	Support & maintenance		x	x	x	x	
2.A.1	Implement Electronic Health Management Information System (eHMIS) in all health facilities						47,619
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x					
	Customize the existing/new application	x					
	Provide training to end users	x					
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
-	Implement the approved Health Information System						Included in eHMIS
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x					
	Customize the existing/new application	x	x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.C.4	Implement Electronic Community Health Information System (eCHIS)						238,095
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application	x	x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.C.2	Implement Telemedicine and Tele education (TM & TE)						928,571
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				

	System deployment		x				
	Support & maintenance		x	x	x	x	
2.C.3	Implement Mobile Health (mHealth)						3,719,285
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application	x	x				
	Provide training to end users	x	x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.A.8	Implement Electronic Human Resource Information System (eHRIS) in all regions of the country						238,095
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.A.3	Implement Health Geographic Information System (HGIS)						1,100,000
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.C.5	Implement Electronic Logistic Management Information System (eLMIS)						238,095
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x					

	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.A.4	Implement Electronic Laboratory Information System (eLIS)						238,095
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x				
	Oversight		x	x	x	x	
2.A.5	Implement Electronic Regulatory Information System (eRIS)						238,095
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application	x	x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.A.6	Implement Health Data Depot (HDD)						952,380
	Assess the current/existing situation	x					
	Lay out leadership and implementation guidelines	x					
	Identify gaps (software, resource, personnel)	x	x				
	Customize the existing/new application		x				
	Provide training to end users		x				
	Procure ICT equipment		x				
	System deployment		x				
	Support & maintenance		x	x	x	x	
2.A.7	Data presentation tools and techniques						
2.B.1	Master facility registry						
2.B.2	Data dictionary and terminology management service (TMS)						
	Total						242,715,809

Appendix

Implementation of the Information Revolution Plan at the Regional Level

The Information Revolution Plan was developed by the Federal Ministry of Health, with contributions from the Regional Health Bureaus. Each Regional Health Bureau (RHB) is responsible for creating a plan for implementation of the Information Revolution at the regional level, ensuring alignment with the framework of the national strategy.

Key Stakeholders

The Regional Information Revolution (RIR) Plan shall include a detailed action plan, adapted to the unique context of each region. The regional directors will gather at the Planning Forum, along with key representatives from the FMOH PPD, and key stakeholders will have the chance to provide further inputs to the RIR Plan. PPD at the regional level are responsible for the development of the RIRs. Engagement and participation of sub regional level representatives, development partners and the private sector representatives is essential during the planning process. The RIR will be approved by the RHB head and execution can commence.

The key stakeholders involved with this planning process shall be as follows:

Table 5: Stakeholder Responsibilities for the RIR Planning Process

Stakeholder Group	Responsibilities
Regional Health Bureau Policy and Planning Directorate (RHB PPD)	<ul style="list-style-type: none"> Responsible for leading the planning process, in consultation with the FMOH PPD, and through engagement with local agencies and partners
National Advisory Committee (NAC)	<ul style="list-style-type: none"> Led by the FMOH PPD, and including key partners focused on health sector strengthening in Ethiopia, they will be responsible for supporting the RHB PPDs, and ensuring alignment with the national level Information Revolution Plan
Performance Monitoring and Evaluation teams	<ul style="list-style-type: none"> These teams, at the national and regional level, shall be engaged with the design of the M&E framework for the RIR plans
RHB HIT representatives	<ul style="list-style-type: none"> HIT shall have oversight of IT infrastructure and responsibly for management of systems in support of the Information Revolution
Zonal Health Office (ZoHO) and Woreda Health Office (WorHO) representatives	<ul style="list-style-type: none"> Administrators from the ZoHO and WorHO, who will be involved with the collection, reporting and consumption of data, will contribute their recommendations from the user perspective, to enhance local ownership of health information
Private sector associations	<ul style="list-style-type: none"> Engagement and participation during the development and implementation of the RIRs

Ongoing Monitoring and Evaluation of Regional Information Revolution Plans

Once established, the performance of the RIR Plan shall be assessed according to the Monitoring and Evaluation frameworks that were created within each plan. The regional M&E framework will serve as a supplement to the performance measures defined in the national Information Revolution and the Health Sector Transformation Plans. The regional M&E process will follow mechanisms that currently exist, as guided by the Health Sector Monitoring and Evaluation Strategic Plan 2016-2020.¹

The RIR Plan will leverage existing periodic performance monitoring meetings that take place quarterly, biannually and annually. These review meetings occur at all levels based on the RHB's own self-assessment and will be used to determine actions needed to ensure achievement of the national Information Revolution Plan. According to the HSDP Harmonization Manual (HHM), there are different participatory review meetings at different levels:

- Central joint steering committee;
- FMoH development partners joint consultative meeting;
- Joint core coordinating committee;
- FMoH-RHB joint steering committee; and
- Annual Review Meeting (ARM)

Each of these review meetings shall be scheduled along a consistent timeline, to ensure that performance is assessed in an ongoing way. Meeting results will be documented and shared between RHBs. This will inform improvements that need to be made, and will also allow for higher performing regions to support regions that are experiencing challenges. Knowledge sharing and reapplication of experience narrows the performance difference and enhances Ethiopia's progress to realizing the goals of the Information Revolution.

In addition, both the National IR Roadmap (NIRR) and the RIRs should be further technically monitored through partnership and technical forums such as:

- The National Policy and Planning Forum .
- National Advisory Committee and M&E Technical Working Group.
- Regional Planning forums
- Regional Performance Review Team
- Regional M&E partners forum

The status of implementation of the NIRR and the RIR plans will be monitored according to the Monitoring and evaluation framework which is prepared in line with the M&E strategy. Regular M&E review meetings are also among the mechanisms where implementation is monitored.

¹ FMoH Monitoring and Evolution Strategic Plan, 2015-2020, p.12-13: Performance Monitoring

Information Revolution Roadmap



Ethiopian Federal Ministry of Health